

Amendments to the Claims:

This listing of Claims will replace all prior versions and listings of Claims in the Application.

Listing of Claims:

Claims 1-12

Claim 13 (currently amended): An electrolyte solution for a metal-oxygen battery where oxygen is reduced at a cathode surface to produce O^{-2} or O_2^{-2} ions, the electrolyte comprising:

a lithium salt selected from the group consisting of $LiPF_6$, $LiBF_4$, $LiClO_4$, $LiC(SO_2CF_3)_3$, $LiN(SO_2CF_3)_2$, $LiO_3SCF_2CF_3$, $LiO_3SC_6F_5$, LiO_2CCF_3 , $LiP(C_6H_5)_4$, $LiCF_3SO_3$; and

a non-aqueous solvent comprises a material selected from the group consisting of dimethyl ~~carbonate~~ carbonate (DMC), dipropyl carbonate (DPC), diethyl carbonate (DEC), ethyl methyl carbonate (EMC), tetrahydrofuran (THF), and 1,2-dimethoxyethane (DME), wherein the oxygen solubility of the solvent is at least 0.1150 cc ~~O_2~~ O_2 /cc at STP.

Claim 14 (currently amended): A metal-oxygen battery where oxygen is reduced at a cathode to produce O^{-2} or O_2^{-2} ions, the battery comprising:

a ~~lithium~~ metal-containing anode;

a cathode for reducing the oxygen; and

an electrolyte solution of a lithium salt selected from the group consisting of LiPF_6 , LiBF_4 , LiClO_4 , $\text{LiC}(\text{SO}_2\text{CF}_3)_3$, $\text{LiN}(\text{SO}_2\text{CF}_3)_2$, $\text{LiO}_3\text{SCF}_2\text{CF}_3$, $\text{LiO}_3\text{SC}_6\text{F}_5$, LiO_2CCF_3 , $\text{LiP}(\text{C}_6\text{H}_5)_4$, LiCF_3SO_3 ; and

a non-aqueous solvent for the electrolyte selected from the group consisting of dimethyl ~~carbonate~~ carbonate (DMC), dipropyl carbonate (DPC), diethyl carbonate (DEC), ethyl methyl carbonate (EMC), tetrahydrofuran (THF), and 1,2-dimethoxyethane (DME), wherein the oxygen solubility of the solvent is at least 0.1150 cc ~~O₂/cc~~ O₂/cc at STP.

Claim 15 (currently amended): The metal-oxygen battery of claim 14, wherein the ~~electro-active~~ cathode comprises carbon.

Claim 16 (currently amended): A lithium-oxygen battery where oxygen is reduced at a cathode to produce O^{-2} or O_2^{-2} ions which react with lithium to produce Li_2O_2 , that deposit on the cathode, the battery comprising:

a lithium metal-containing anode;

a cathode for reducing oxygen; and

an electrolyte solution of a lithium salt selected from the group consisting of LiPF_6 , LiBF_4 , LiClO_4 , $\text{LiC}(\text{SO}_2\text{CF}_3)_3$, $\text{LiN}(\text{SO}_2\text{CF}_3)_2$, $\text{LiO}_3\text{SCF}_2\text{CF}_3$, $\text{LiO}_3\text{SC}_6\text{F}_5$, LiO_2CCF_3 , $\text{LiP}(\text{C}_6\text{H}_5)_4$, LiCF_3SO_3 ; and

a non-aqueous solvent for the electrolyte selected from the group consisting of dimethyl ~~carbonate~~ carbonate (DMC), dipropyl carbonate (DPC), diethyl carbonate

(DEC), ethyl methyl carbonate (EMC), tetrahydrofuran (THF), and 1,2-dimethoxyethane (DME), wherein the oxygen solubility of the solvent is at least 0.1150 cc O_2/cc at STP.

Claim 17 (currently amended): The ~~metal-oxygen~~ lithium-metal battery of claim 14, 17 wherein the cathode comprises carbon.

Claim 18 (new): An electrolyte solution for a metal-oxygen battery where oxygen is reduced at a cathode surface to produce O^{-2} or O_2^{-2} ions, the electrolyte comprising:

a lithium salt selected from the group consisting of $LiPF_6$, $LiBF_4$, $LiClO_4$, $LiC(SO_2CF_3)_3$, $LiN(SO_2CF_3)_2$, $LiO_3SCF_2CF_3$, $LiO_3SC_6F_5$, LiO_2CCF_3 , $LiP(C_6H_5)_4$, $LiCF_3SO_3$; and

a non-aqueous solvent further comprising a combination of propylene carbonate and at least one of a material selected from the group consisting of dimethyl carbonate (DMC), dipropyl carbonate (DPC), diethyl carbonate (DEC), ethyl methyl carbonate (EMC), tetrahydrofuran (THF), and 1,2-dimethoxyethane (DME), wherein the oxygen solubility of the solvent is at least 0.1150 cc O_2/cc at STP.

Claim 19 (new): A metal-oxygen battery where oxygen is reduced at a cathode to produce O^{-2} or O_2^{-2} ions, the battery comprising:

a metal-containing anode;

a cathode for reducing the oxygen;

an electrolyte solution of a lithium salt selected from the group consisting of LiPF_6 , LiBF_4 , LiClO_4 , $\text{LiC}(\text{SO}_2\text{CF}_3)_3$, $\text{LiN}(\text{SO}_2\text{CF}_3)_2$, $\text{LiO}_3\text{SCF}_2\text{CF}_3$, $\text{LiO}_3\text{SC}_6\text{F}_5$, LiO_2CCF_3 , $\text{LiP}(\text{C}_6\text{H}_5)_4$, LiCF_3SO_3 ; and

a non-aqueous solvent further comprising a combination of propylene carbonate and at least one of a material selected from the group consisting of dimethyl carbonate (DMC), dipropyl carbonate (DPC), diethyl carbonate (DEC), ethyl methyl carbonate (EMC), tetrahydrofuran (THF), and 1,2-dimethoxyethane (DME), wherein the oxygen solubility of the solvent is at least 0.1150 cc O_2 /cc at STP.

Claim 20 (new): The A metal-oxygen battery of claim 19 wherein the metal-containing anode is a lithium metal-containing anode.

Claim 21 (new): An electrolyte solution for a metal-oxygen battery where oxygen is reduced at a cathode surface to produce O^{2-} or O_2^{2-} ions, the electrolyte comprising:

a lithium salt selected from the group consisting of LiPF_6 , LiBF_4 , LiClO_4 , $\text{LiC}(\text{SO}_2\text{CF}_3)_3$, $\text{LiN}(\text{SO}_2\text{CF}_3)_2$, $\text{LiO}_3\text{SCF}_2\text{CF}_3$, $\text{LiO}_3\text{SC}_6\text{F}_5$, LiO_2CCF_3 , $\text{LiP}(\text{C}_6\text{H}_5)_4$, LiCF_3SO_3 ; and

a non-aqueous solvent further comprising a combination of γ -butyrolactone (γ -BL) and at least one of a material selected from the group consisting of dimethyl carbonate (DMC), dipropyl carbonate (DPC), diethyl carbonate (DEC), ethyl methyl carbonate (EMC), tetrahydrofuran (THF), and 1,2-dimethoxyethane (DME), wherein the oxygen solubility of the solvent is at least 0.1150 cc O_2 /cc at STP.

Claim 22 (new): An electrolyte solution for a metal-oxygen battery where oxygen is reduced at a cathode surface to produce O^{2-} or O_2^{2-} ions, the electrolyte comprising:

a lithium salt selected from the group consisting of $LiPF_6$, $LiBF_4$, $LiClO_4$, $LiC(SO_2CF_3)_3$, $LiN(SO_2CF_3)_2$, $LiO_3SCF_2CF_3$, $LiO_3SC_6F_5$, LiO_2CCF_3 , $LiP(C_6H_5)_4$, $LiCF_3SO_3$; and

a non-aqueous solvent further comprising a combination of dimethyl sulfoxide (DMSO) and at least one of a material selected from the group consisting of dimethyl carbonate (DMC), dipropyl carbonate (DPC), diethyl carbonate (DEC), ethyl methyl carbonate (EMC), tetrahydrofuran (THF), and 1,2-dimethoxyethane (DME), wherein the oxygen solubility of the solvent is at least 0.1150 cc O_2 /cc at STP.

Claim 23 (new): An electrolyte solution for a metal-oxygen battery where oxygen is reduced at a cathode surface to produce O^{2-} or O_2^{2-} ions, the electrolyte comprising:

a lithium salt selected from the group consisting of $LiPF_6$, $LiBF_4$, $LiClO_4$, $LiC(SO_2CF_3)_3$, $LiN(SO_2CF_3)_2$, $LiO_3SCF_2CF_3$, $LiO_3SC_6F_5$, LiO_2CCF_3 , $LiP(C_6H_5)_4$, $LiCF_3SO_3$; and

a non-aqueous solvent further comprising a combination of N-methyl pyrrolidinone (NMP) and at least one of a material selected from the group consisting of dimethyl carbonate (DMC), dipropyl carbonate (DPC), diethyl carbonate (DEC), ethyl methyl carbonate (EMC), tetrahydrofuran (THF), and 1,2-dimethoxyethane (DME), wherein the oxygen solubility of the solvent is at least 0.1150 cc O_2 /cc at STP.

Claim 24 (new): An electrolyte solution for a metal-oxygen battery where oxygen is reduced at a cathode surface to produce O^{2-} or O_2^{2-} ions, the electrolyte comprising:

a lithium salt selected from the group consisting of $LiPF_6$, $LiBF_4$, $LiClO_4$, $LiC(SO_2CF_3)_3$, $LiN(SO_2CF_3)_2$, $LiO_3SCF_2CF_3$, $LiO_3SC_6F_5$, LiO_2CCF_3 , $LiP(C_6H_5)_4$, $LiCF_3SO_3$; and

a non-aqueous solvent further comprising a combination of tetraethylene glycol dimethyl ether and at least one of a material selected from the group consisting of dimethyl carbonate (DMC), dipropyl carbonate (DPC), diethyl carbonate (DEC), ethyl methyl carbonate (EMC), tetrahydrofuran (THF), and 1,2-dimethoxyethane (DME), wherein the oxygen solubility of the solvent is at least 0.1150 cc O_2 /cc at STP.

Claim 25 (new): An electrolyte solution for a metal-oxygen battery where oxygen is reduced at a cathode surface to produce O^{2-} or O_2^{2-} ions, the electrolyte comprising:

a lithium salt selected from the group consisting of $LiPF_6$, $LiBF_4$, $LiClO_4$, $LiC(SO_2CF_3)_3$, $LiN(SO_2CF_3)_2$, $LiO_3SCF_2CF_3$, $LiO_3SC_6F_5$, LiO_2CCF_3 , $LiP(C_6H_5)_4$, $LiCF_3SO_3$; and

a non-aqueous solvent further comprising a combination of triethylene glycol dimethyl ether and at least one of a material selected from the group consisting of dimethyl carbonate (DMC), dipropyl carbonate (DPC), diethyl carbonate (DEC), ethyl methyl carbonate (EMC), tetrahydrofuran (THF), and 1,2-dimethoxyethane (DME), wherein the oxygen solubility of the solvent is at least 0.1150 cc O_2 /cc at STP.